

Macroporous Si Particle Collimator, Phase I

Completed Technology Project (2018 - 2019)



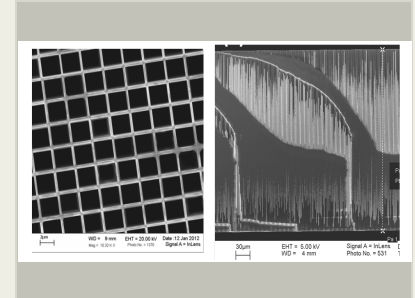
Project Introduction

Collimators are used in all X-ray and particle detectors as well as in multiple commercial applications that use X-ray imaging to maximize the sensitivity, resolution and contrast of images. State-of-the-art collimators can offer either high off-axis blocking or high on-axis transmission, and are heavy and bulky. MicroXact Inc. is proposing to develop a particle collimator for NASA and commercial applications that will combine superior mechanical stability, light weight, with efficient off-axis blocking and high on-axis transmission efficiency. The proposed collimator is based on macroporous silicon with conformal pore wall coating by high atomic number material. In Phase I of the project the MicroXact will finalize the performance specifications, will design the collimator structure, will fabricate the collimator prototype and will perform testing of on-axis transmission to fully validate the proposed approach. In Phase II MicroXact will optimize the material fabrication, and design and fabricate a packaged particle collimator that will fully comply to NASA specifications and will perform testing in relevant environment. The collimators and antiscatter grids developed on this SBIR project will be commercialized in Phase III.

Anticipated Benefits

Due to the unique features (high level of off-axis blocking, high geometrical transmission, mechanical robustness and cost effectiveness) over competing technologies, the proposed MPSi particle collimators are expected to find a number of applications in NASA missions (Explorer missions, Decadal survey missions IMAP, MEDICI, GDC, DYNAMICS, DRIVE Initiative, DISCOVERY, New Frontiers, and CubeSat, SmallSat missions, Sub-orbitals, etc.).

Similar design of the particle and X-ray collimators is expected to find considerable DoE applications spanning from plasma parameter monitoring in tokamaks, X-ray and particle detection in accelerators, lightning and aurora studies, etc. The biggest market for the proposed component is X-ray antiscatter grid for medical X-ray imaging.



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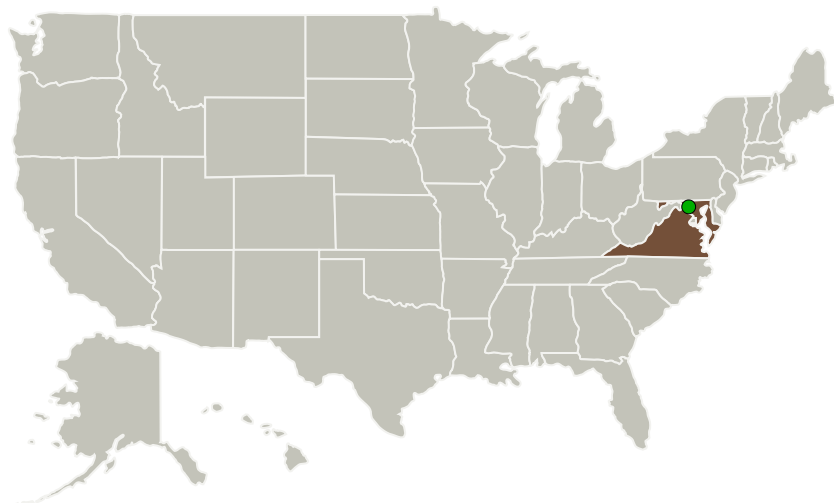
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
MicroXact, Inc.	Lead Organization	Industry	Radford, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland	Virginia
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Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141168>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MicroXact, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Vladimir Kochergin

Co-Investigator:

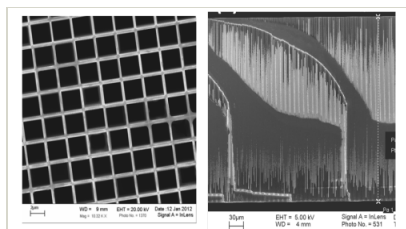
Vladimir Kochergin

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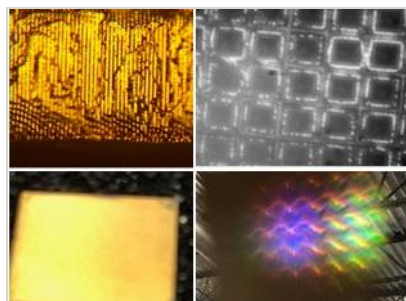
Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/132692>)



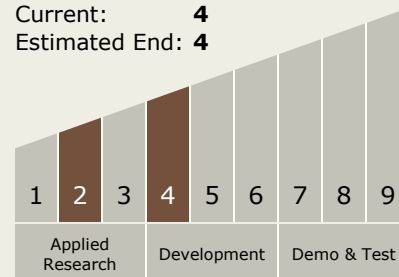
Final Summary Chart Image

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(<https://techport.nasa.gov/image/127391>)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.3 In-Situ Instruments and Sensors
 - TX08.3.1 Field and Particle Detectors

Target Destinations

Earth, Others Inside the Solar System, Outside the Solar System